

## CONSTITUTIONAL PSYCHOPATHIC INFERIOR PERSONALITY—WITH OR WITHOUT PSYCHOSIS\*

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IF it is possible to help solve the problem of how to care for the group of psychically oblique or perverted persons, who should rightly be classified by psychiatrists as having constitutional psychopathic inferior personality (C. P. I.)—in this paper the letters C. P. I. will be used to refer to this class of patients—we would automatically solve 10 per cent of the problem cases of the lunacy court; as well as an unbelievably large percentage of the most difficult problems of such organizations as outdoor relief, veterans' bureau, juvenile protective, mental hygiene, police and drug addiction agencies, and criminal courts, truant officers, and all other activities having to do with those human beings, who, by reason of psychic instability and perversion, are or seem to be unable to react successfully to the normal present-day environment, especially in the urban centers.

Because the ramifications of the problems presented in these patients are inseparable from the economic and social life of every community, and because these ramifications are always as pathologic as those of a malignant growth anywhere else, it behooves medical science to move forward militantly, in an effort to help solve some, at least, of the problems involved.

Thus far very little of a constructive nature has been done in regard to these persons other than to arrive at certain more or less satisfactory definitive formulations, some of which will be here considered.

### DOMINANT CHARACTERISTICS

1. Constitutional psychopathic inferior personality (C. P. I.) is an inherent constitutional condition which is the basis of personality, for the reason that it represents the sum of psychic elements of that individual. These elements are exhibited objectively in every case, in terms of pathological behavior.

It is not a disease, and is therefore not curable. Being a constitutional fault it may be corrected, but only by such means and methods as are capable of supplying psychic stability by the engrafting of normal acquired character factors—the term "character" being here used as the reaction to conventions and standards. These corrective measures are attained by the repetition of normal performances that are imperatively and successfully insisted upon by an intelligent preceptor who has been trained for this work. From the standpoint of clinical psychology this corrective work seems to be capable of accomplishment in a large

number of persons who would be complete failures if left to themselves.

2. The pathological behavior (symptomatology) of these individuals is the essential expression, at least in part, of the following definite constitutional psychic factors:

(a) Hereditary taint.

(b) Hyper- or hypoirritability of the emotional sphere.

(c) Dysfunction of the intellectual sphere, even though possessed of normal intelligence level.

(d) Concomitant imbalance, obliquity or perversion of reasoning, judgment and will.

### DEFINITIVE FORMULATIONS

A. *Hereditary Taint*.—This was shown with significant regularity and frequency in the direct line or in collaterals in patients who were specially studied.

B. *Hyperirritability or Hypoirritability of the Emotional Sphere*.—The term irritability is used in the biological sense as the capacity of receiving and responding to stimuli in a manner that is adaptive or useful. In this connection I quote Watson, with special reference to perverted emotions: "Society and one's own organization often make emotional outlets impossible along certain lines. When emotional expression is blocked in any one region, outlet seems to take place somewhere else." (The psychological definition of an emotion is that it is the consciousness on the part of an individual of some hereditary reflex taking place within the body. The acting mechanism is held to be closely associated with certain glandular apparatus and their functions, according to Cannon and others.) We are here chiefly concerned with the expression of perverted emotions in terms of behavior.

C. *Irregularities or Imbalance of the Intellectual Sphere*.—Integrity of the intellectual sphere implies free use of the reason, unimpaired memory, normal perception—the ability to think correctly. Thus it is seen that the C. P. I. patient is really afflicted with more or less perversion of the intellectual sphere that may or may not be affected by disease.

D. *Imbalance of Judgment*.—Judgment is here taken to mean the awareness of all extrinsic or intrinsic stimuli that reach the perception and, having become aware of them, the consequent ability to understand their nature and quality—to accept, reject and choose between them, *i. e.*, to appreciate them.

Judgment is thus a possession or asset that may be bad or badly used. The judgments of a constitutional psychopathic inferior (C. P. I.) patient are necessarily colored by the kind of an emotional sphere he or she possesses.

*Imbalance of Will*.—The will is here considered as being the expression of those psychic factors which regulate behavior or voluntary acts. It thus has to do with reasoning and libido in its widest sense; it is necessarily influenced by pre-

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vious experiences and therefore by quantitative memory.

In constitutional psychopaths the will is a variable quantity—and the memory as well. Both may well be termed capricious. This helps to explain many of their instabilities. In those whose factual memory is exceptionally good—and we find many of them—their inherent instability is due to judgment-and-will or emotion-and-will imbalance.

#### CLASSIFICATION OF SUBGROUPS

Sharp distinctions must be drawn between the various groups that are at present accepted by the Surgeon-General's office, even while admitting them to the general classification of C. P. I. This is as important as to differentiate between the various psychoneuroses. There is just as much difference between a C. P. I. or inadequate personality and a C. P. I. emotional, unstable person as there is between a neurasthenic and an hysterical patient. The fact of a wide divergence in symptomatology among the subgroups does not necessarily deny the basic diagnosis of C. P. I.

#### SUBGROUPS OF C. P. I.

Observe a parade of the constitutional psychopathic inferiors (C. P. I.'s) marching in columns of subgroups:

1. Inferior or inadequate group.
2. Paranoid personality group.
3. Sex deviates group.
4. Emotional instability group.
5. Criminal group.
6. Pathological liars group.
7. Nomadism group.

Here we have seven groups of individuals possessing all the dominant characteristics of C. P. I. and differing only in group expression. It would not be difficult to at once denominate the various groups on sight. Let us consider them in turn:

1. *Inferior or Inadequate Group*.—We see here the ill-formed, timid, physically and psychically impoverished. Their attitudes show plainly their inadequate reaction to life.

2. *Paranoid Personality Group*.—This column is a strutting, contentious group—intolerant and egotistic to such a degree that they have not been able to adjust themselves to their environment. Many are well educated. Many have reached some degree of eminence, but their lives will show a constant succession of behavior phenomena characterized by strife and littered by countless letters and pamphlets which they have used as ammunition in their warfare against odds which they themselves have erected. Numberless disappointments have made them only the more obstinate. So preoccupied are they with grievances that they present always a ruffled appearance.

3. *Sex Deviates Group*.—One sees here a quite different attitude. Many are supercilious. Most of them are inclined to preoccupy themselves with their personal appearance. They present a quasi-sophisticated expression. They are not obtrusive, but rather retiring and more or less shut in. Some of them are obviously disturbed and seem to be expectant of attack. They are inclined to be sus-

picious. Many of this group have attained to superior educational levels.

4. *Emotional Instability Group*.—This group, like the first, is readily picked out. Some will be clamorous and hilarious—the easily angered and the just as easily diverted; others will be more depressed and exhibit their depression by copious floods of tears—the latter not commensurate with any true grief; in this group will be found many who attempt suicide by all sorts of queer and ill-considered methods and means, without success or the will to succeed—the “bluff” suicide. We see many of them in the lunacy courts, and one notes with amused surprise that so many of the females come into court “made up” as though doubling for a movie queen. Their instability displays itself in a jaunty exterior; they seem to feel they have justified their previous disappointment by their fake tragedy and do not even sense the absurdity of it. Many in this group are drug addicts and alcoholics who go on a spree “to forget.”

5. *Criminalism Group*.—This is a sinister group—antisocial, furtive or overbold. By trial and success (?), and by trial and failure, they have taken up crime as their business in life. Many have sufficient insight to enable them to point out the weak points in their own characters. A great many of this group are emotionally hypo-irritable, they have no fear of consequences and are not deterred by a normal repulsion from doing atrocious acts, even though they may know enough to call them atrocious. They are the ones who follow the lines of least resistance and are dominated by libido—using the term in its broad sense.

6. *Pathological Liars' Group*.—This group resembles qualitatively the fifth, but is neither so antisocial nor so sinister. Compared to the other group they are like the pickpocket, as compared to the gunman and holdup. They are less sophisticated and more annoyed or disturbed because of their obliquity. They lie and steal frivolously, and as a rule are ashamed of it.

7. *Nomadism Group*.—The hobo and the nomad, who is a nomad because of inherent instability, need no description to call attention to them in a group such as is here assumed.

#### FURTHER ANALYSIS

These individuals have been called “feeble-minded in all psychic spheres except the intellectual.” The majority of them are born with a sufficiently rich fund of intellectual endowment for normal needs, but they are impoverished in the factors necessary to normal performance. The result is that they never steadily maintain a performance level that would be warranted or expected because of their intelligence level.

In a conversation with Professor Kraepelin on this subject he stressed this point, which corresponded with my own observations, and we agreed upon another vital point which is: that, from the standpoint of the state, these unstable “*deséquilibrés*” (so described by Regis) are always a potential menace, for the reason that they are so unstable and yet are so endowed in the majority

of cases with high levels of intelligence that they never react for long to normally constituted environments that are at all complex. Their intelligence quotient may be high, but their achievement quotient is always low or perverted.

There are a few, whose achievements have ranked them as "geniuses"—examples are Tolstoi, Wagner, (ref. May)—but an analysis of the sum of the daily psychic performances of even such a group will show a total value far below their intelligence potential.

In actual practice the records show with monotonous regularity that these individuals proliferate an enormous mass of pathological behavior out of all proportion to their numbers. One cannot compute the ratio that exists between the relatively small number of patients who are the basis of this paper and the unbelievable amount of "grief" they have caused.

Measured in such terms as economic disaster, mental anguish to family, friends, and society, or in the actual destruction of human life alone, it is appalling.

Practically every writer on this subject voices the same idea. In 1922 May in his book on "Mental Diseases" concluded his valuable and comprehensive chapter treating with this subject with these words: "The influence of these individuals on the community at large is something we have no means of estimating at the present time."

Consider my own series and we find seven murders; one of these, preceded by the abduction of a twelve-year-old girl, has become notorious. My series show a mass of pathologic behavior phenomena that runs the gamut, from persistent minor infractions to the most horrific acts: thefts, embezzlements, burglaries, holdups with deadly weapons, check-passing, attempted suicides, drug addiction, self-mutilation, murder with mutilation, abduction with murder and calculated mutilation of the body for the purpose of removing it from the scene of the murder and its disposition in order to obtain ransom. It is a grewsome parade—pathetic often—tragic often—pathologic always. The numbers of C. P. I. patients who attempt suicide is really appalling—and in these attempts many make the same characteristic failures as they make in the other activities they attempt—they seem incapable of making a success of anything, even of suicide.

#### DANGER OF CONSTITUTIONAL PSYCHOPATHS

The constitutional psychopath is more dangerous to society—and therefore to the state—than either the insane or feeble-minded.

For a long time society has realized the necessity for medical supervision of the insane. For a much shorter time it has been shown that feeble-mindedness is a medico-psychological problem, with legal and social welfare contacts; and society had first to be educated before it finally acquiesced in the medical dicta regarding it. In both instances the law, because of the personal and property rights involved and other purely legal

phases, has attempted to deal with them. They have thus become medico-legal problems. So unfortunate has been the history of the attempt on the part of the courts of law to deal with what are primarily medical matters, that certain phases of these attempts have become scandalous. Instead of being aids to justice they have become aids to further crass injustice and selfish personal ends.

#### ABSURDITY OF JURY TRIALS IN MEDICO-LEGAL CASES

Nevertheless, something constructive has been done and the remaining weaknesses and evils are so apparent that they are capable of being corrected—provided society can be shown that it is just as absurd to convict a person of alleged smallpox by having a jury trial, as it is to so "convict" a person "accused" of insanity. Or to allow a truly insane person to demand a jury trial for the purposes of proving him free from insanity, that is, asking twelve laymen to make a diagnosis in a peculiarly difficult medical specialty and where a group diagnosis has already been made under the most favorable circumstances.

The great good to society is that the insane and the feeble-minded are really being more or less mobilized and segregated, with the consequent reduction of danger to society and the obvious betterment to themselves.

I doubt if tuberculosis is more of a menace to society than constitutional psychopathy.

And yet tuberculosis has been surveyed and studied to such an extent that society everywhere recognizes its menace and is willing to foot any bill that may be incurred by medical agencies for its prevention alone, not to mention the agencies for its cure.

It seems to be our plain duty as neuropsychiatrists to emulate the scientific and business methods of those medical men who have placed tuberculosis on such a firm basis and by so doing have really begun to solve its problems. First let us get at the basic truths of this psychic obliquity, which we term constitutional psychopathy, then crystallize our ideas into well defined form and subsequently educate society and its agencies to recognize it. The law will surely follow the call if society makes that call imperative.

#### CONCLUSIONS

The chief conclusions at which I have arrived are these:

1. Every constitutional psychopath is a potential menace to society for the reason that he or she is unable, because of inherent perversions, to react successfully to the complicated, present-day normal environment without suitable supervision.

2. The state has the duty, as well as the authority, to mobilize its forces against any menace from without or from within. This is inherent in the state. In disasters, riots, and epidemics of disease we are accustomed to the exercise of this authority—even if, in so doing, our personal freedom is denied. We are accustomed to the segregation and isolation of patients afflicted with certain dis-

eases, such as smallpox. The public has come to recognize the suitability and necessity for medical supervision of the insane and custodial care for the feeble-minded.

It is just as true that the constitutional psychopaths should be identified early: segregated when necessary; and kept out of circulation just as long as is necessary to rebuild their impoverished psychic characters to the point where the individual can float himself or herself. In other words, up to the time when he or she can successfully react to normal environment.

3. Whereas the insane, and the feeble-minded to a lesser extent, are almost total economic liabilities and a complete burden upon the state, this will not be true of the colonies that could be established for the constitutional psychopaths—and for very obvious reasons. Comparatively few insane are so little deranged in their intellectual sphere as to render them economic producers. The feeble-minded, who comprise the lower grades, are so constituted that they never had or will have sufficient intelligence to function other than on the red side of the ledger.

On the contrary the constitutional psychopaths, while inherently lacking in the ability to maintain of themselves, a sustained exercise of good judgment, a will to do and to manifest the emotional integrity requisite to psychic balance, nevertheless do possess the chief requisite, namely, intellectual competence, which, if governed and directed, is quite capable in many forms of dominating the weaker factors of psychic components by building up acquired characteristics that are good and then maintaining them.

If the foregoing be true, then it follows that there is some assurance that a more or less satisfactory solution of at least the graver problems of this particular menace may be evolved.

#### RECOMMENDATIONS

My deductions lead me to make the following recommendations:

(a) That there be established by the state certain colonies where the citizens of this psychically oblique group could be placed through suitable medico-legal process, just as early as the individual begins to fail to react to environment to the extent that, because of his or her behavior, a diagnosis of dangerous C. P. I. may be made sure and definite.

(b) The citizens of such colonies should be placed therein for undetermined periods and released only at the discretion of suitably constituted boards. Upon release there should be maintained a suitable supervision of every patient and for as long as residence within the state boundaries is maintained.

(c) The diagnosis of "constitutional psychopathic individual" should not be allowed as a defense for crime, except in such cases as where—to use the legal definition of insanity—the alleged

criminal is in such a condition of mind as to prevent him or her from knowing the difference between right and wrong, and is incapable of appreciating the nature and quality of the alleged criminal act or acts. This will protect the cases of C. P. I. with psychosis.

#### COMMENT

In order to justify the opening statement of the paper and to further emphasize it, I call attention to the following:

*Frequency.*—An approximate idea of the numbers of identified constitutional psychopathic individuals may be arrived at through a consideration of the following facts:

One out of every two thousand recruits in our own Army during the period of the World War was rejected on this count by local examining boards. Innumerable cases were actually recruited for lack of identification. Those of us who sat as summary court officers in the various camps and military organizations saw many of the latter.

The reports of the Phipps Psychiatric Clinic show an admission rate of these cases of over 6 per cent during a five-year period.

*Special Groups Personally Observed.*—In a survey which I made of all cases that came before the Lunacy Commission of Los Angeles County through a three-year period, approximately 10 per cent of the alleged insane were diagnosed C. P. I., with or without psychosis. (The total of all alleged insane was over 11,000. Of these about 1100 were C. P. I., with or without psychosis, and of these I examined my share.)

In my service as neuropsychiatrist at the Whittier State School during several years service, another fairly large group of these cases was identified.

As a member of the neuropsychiatric department of the United States Army, Medical Corps, another fairly large group was observed by me while acting on various special boards and in the ordinary service, during my service in the Army, through a period of over three years.

These cases are becoming a common occurrence in the routine of all my clinics:

Thus, on April 13, in my service at the Neuropsychiatry Clinic of the Los Angeles County General Hospital three serious cases were brought in by the Out-Door Relief agencies. During one session of the Lunacy Commission, on April 11, I saw seven cases; four of these had attempted suicide. At the neuropsychiatry department of the Santa Rita Clinic of the Catholic Charities Bureau, on April 23, I saw three problem cases of C. P. I., involving tragic as well as pathetic episodes—each one the nucleus of an immense amount of family grief.

The writer's experience has also been that of others who have studied these cases. So this ominous parade marches on, and thus far we have no

means or methods for solving and administering its grave problems.

#### SUMMARY

To summarize the foregoing may I say that:

1. The group of cases of constitutional psychopathic (C. P. I.) individuals is certainly larger than has ever been computed.

2. Any group of individuals possessing the heterodoxical psychic components, which all C. P. I.'s possess, are such a menace to the integrity of the community that intensive research becomes imperative to the end that means for the administration of their lives and activities be evolved.

3. This is primarily a neuropsychiatric problem, and we who are neuropsychiatrists must accept our responsibilities; but we should invite the cooperation of all other agencies having to do with social problems of this nature.

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#### DISCUSSION

WALTER F. SCHALLER, M. D. (909 Hyde Street, San Francisco).—Doctor Orbison has taken up one of the great problems of the neuropsychiatrist, that of the constitutional psychopath. The recognition of this type is not difficult for the specialist, but to the layman, on the contrary, preservation of ordinary intelligence and lack of manifest psychosis raises a serious doubt as to irresponsibility and need of supervision. The diagnosis, as the writer has pointed out, is based on obvious imbalance in the highest psychic functions, those of morals, will and judgment, and on the loss of emotional control. This condition is manifested by occupation failures and social maladaptations. It is not a condition by definition that is remediable by medical or psychological treatment, but is ingrained and a lifelong problem. Those with initiative, drift into criminality; those without, form a large group of the inadequate and irresponsible. The solution of the problem by supervision, control and segregation, as in colonies, advised by Doctor Orbison, meets with my approval; but with the present system of court trial by jury, overcrowding of the state institutions, and lack even of a state hospital for the criminal insane, I see but little chance of the establishment of such a colony at present. Would it not be advisable to make an attempt to recognize these cases in the school period, and by the aid of a social service follow-up system, endeavor to place these cases in suitable social and occupational environments? This course would further tend to education of the public to the fact, which they largely do not suspect, that we have a large number of inadequate individuals in our midst who are not feeble-minded, insane, or sick. It is by an awakened interest, by education and example, that the solution of such a problem follows as a matter of course.

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EDWARD W. TWITCHELL, M. D. (909 Hyde Street, San Francisco).—Constitutional psychopathic personalities form an important part of society. The great majority of them are without psychosis although individuals of this type are peculiarly subject thereto. In fact it may be taken for granted that the vast majority of psychoses are built upon a groundwork of psychopathic personality.

Those in whom the real psychosis never develops are numerous enough to cut a very important figure. It would be a much duller world if we did not have them. Most of the geniuses come within this group, and a very large number of the talented. The world would be much poorer if deprived of the work, especially in the arts, of the psychopathic personality. It has been said that if the rattlesnake were to be exterminated a picturesque feature would disappear from

the landscape, one that added zest to mountaineering. Something of the same sort can be said, with a better justification, for the psychopathic personality. His irascibility makes him often a thorn in the flesh, his irresponsibility is a sore trial to his family and others who have to live with him, however amusing the public find him. The wanderer or nomad is often a romantic figure. The criminal group, however, we would willingly dispense with. They are often very persuasive, and their suave manners and insinuating ways have resulted in the ruin of many an honest person.

The sex group fill one with horror, disgust, or sympathy, depending largely upon how much one has studied them. They themselves in large part are far from seeking sympathy, many of them looking upon themselves as the salt of the earth, fashioned out of superior clay. They point with pride to the eminent ones who belong to their group.

The question of responsibility of these individuals is an important one. While it may be admitted that their condition is the result of congenital traits and early environmental influences and little due to their own vicious indulgences, it must likewise be admitted that in large part they can exert self-restraint within considerable limit and that they do what they do oftentimes because they are taking advantage of the laxness of law enforcement. The same individual faced with what he knew to be certain and severe punishment would achieve a restraint which he fails to exercise when he has no such fears. This is notably true of the lying and swindling group, somewhat less so of the sex perverts and possibly of the irascibles. If society were, however, to accord them the immunity which many of them demand and their sentimental sympathizers accord them, life would be too difficult for the normals; so, for the present, the psychopathic personality should be forced to accept responsibility even though he be granted a mitigated responsibility under certain conditions.

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C. M. HAVILAND, M. D. (701 Medico-Dental Building, San Diego).—Doctor Orbison's paper brings to the attention of neuropsychiatrists, who should logically be the leaders in this department of research, the vital importance of the question as to what is the best way of dealing with such problem cases as are referred to in Doctor Orbison's paper.

As a first step in the solution of these problem cases we should make every effort to differentiate sharply between those individuals who are frankly mentally or physically defective or who may be suffering developmentally from the remote infections of early life, and who because of these handicaps are limited in their ability to reach a standardized "behavior goal"; and those who become psychopathic as a result of their emotional reactions to the unfortunate (psychopathic) methods employed in their training by methods such as suggestion, example, prohibitions, punishments.

With individuals belonging to this latter class the symptoms of personality defects are largely mechanisms of defense erected against what they feel is being put over on them, while with those of the former group the symptomatology of the psychopathy is more indicative of a fundamental weakness in the make-up of the individual either by inheritance or as a result of diseased processes—somewhat analogous to the differences between functional and organic disturbances.

If we remember that the only behavior which is inherently natural to any individual is instinctive and primitive and also that the instincts, with their accompanying emotions, are quantitatively different in each individual, we will have some basis of understanding why it is that the emotional reactions to environmental situations (with the lessons to be learned by the experience) differ so markedly one from another in any group. Why it is that the testimony given by

one individual stresses one thing while that of another emphasizes a different element in the same situation.

Matters could not well be otherwise, else we would all be alike as "two peas in a pod"; consequently our character differences rest upon the quantitative differences in the inherited instincts with their accompanying emotions.

With this knowledge before us and with a group classification made between the organic defective with his accompanying psychopathic behavior and the purely functional psychopath where behavior alone is involved, our problem is much simplified and our therapeutic efforts should be more exact. Treatment need not be so empirical as at present where each worker pursues an independent path of his own choosing.

In the true defective only a certain degree of progress is possible. If the upper limit of such progress lands him well within the public "safety zone," well and good. If such goal is not possible, segregation is all that can be done, and under such grouping he must be handled.

In the case of the functional psychopath, treatment becomes a matter of reëducation, but not in a situation where he is confined only a few hours a day. The individual should be kept in the new surroundings, to which he has been sent, and where a real effort is made to understand him and his difficulties, and solutions of his personal problems are worked out with him.

We should bear in mind that in our efforts to reëducate the individual we have not only to change his whole attitude toward life, but we also have to overcome stereotyped, habitual and automatic behavioristic activities which have become "fixed" from long usage.

## THE RADIO KNIFE IN DERMATOLOGIC SURGERY\*

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THE radio<sup>†</sup> knife is an instrument which divides tissue by means of an electric arc which is formed at the point of contact between knife and tissue. It has been used mostly in the surgery of the malignancies, especially by Doctor Clarke of Philadelphia and Doctor Wyeth of New York. Very little has appeared in the literature in regard to this modality. Mention has been made of it by Wyeth, Clarke, and Ward in articles dealing with electrothermic therapy in general. Ward<sup>1</sup> has given an excellent description of the physics of the modality, and has shown microphotographs of tissues cut by it. Hollander<sup>2</sup> has recently written an article concerning its use in dermatology. I have been using this knife for about two years in my private practice and on my service at the Alameda County Hospital, where considerable cutaneous surgery is done. It has worked so satis-

factorily that I have come to look upon it as almost indispensable.

### PHYSICS OF THE CURRENT

The current employed is a bipolar one with a voltage of about 500 and a milliamperage of about 5. The characteristic feature of the current is that it has a very high frequency, varying from one and a half to six million cycles. The waves are of the undamped type. This type of current can be produced by an instrument employing radio tubes exactly similar to those used for radio telephone transmitters. The original instruments and some of the present ones are of this type. Certain electric difficulties such as burnt-out tubes, failure of the tubes to oscillate, choking of the tubes during operation, have resulted in the development of an apparatus which eliminates the tubes entirely, and depends upon foolproof spark gaps, coils, and condensers to produce the high frequency current. An advantage of this type of construction is that it enables the same outfit to be used for electrocoagulation or electrodesiccation merely by throwing a small switch to the modality desired.

When the knife is brought in contact with tissue an arc is produced which disintegrates the tissue ahead of the knife as it moves along. *The cutting is done by this arc and not by the knife itself.* The arc does this by a process of cell destruction known as molecular disintegration.

### METHOD OF USE

An anesthetic is always necessary for operations with this knife. If a local anesthetic is used the area should be blocked rather than infiltrated. Gas-oxygen or chloroform are preferable when a general anesthetic is indicated on account of the danger of the arc igniting ether or ethylene.

One of the wires is attached to a piece of lead foil measuring about six by eight inches. This is fastened to the patient's moistened skin at some site remote from the operative field. The usual plan is to place the lead foil beneath the buttocks and to hold it in place by a towel encircling it and the body. The other wire is attached to the knife. This "knife" is generally a flexible piece of steel about 3 centimeters long, 3 millimeters wide, and 1 millimeter thick. It is held in an insulated handle.

The surgeon should wear rubber gloves to protect himself from shock. I formerly wore two pair of ordinary surgeon's gloves, but now wear only one pair, as I determined by experiment that the voltage used will not penetrate the usual glove. I have never received a shock while operating. A foot switch is of great value in turning the current on and off.

When the knife is brought into contact with the skin an arc is formed which cuts as rapidly or as slowly as the knife is moved. One's first inclination is to attempt to cut with the dull blade just as one would with a scalpel, but this is not desirable. Gentle pressure will carry the knife and arc through the skin with an ease and speed superior to the scalpel. As the arc cuts through the skin the lymphatics and smaller blood vessels are sealed. This lowers the danger of metastasis. More effective blockage of blood and lymph chan-

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\* Laboratory work from the laboratories of the Samuel Merritt Hospital, Oakland. Courtesy of Dr. Robert Glenn.

† The terms "radio knife," "endothermy knife," "acusetor," and "high frequency cutting knife" are synonymous.